

New Mexico Standards and Benchmarks

Strand I: Scientific Thinking and Practice

Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

K-4 Benchmark I: Use scientific methods to observe, collect, record, analyze, predict, interpret, and determine reasonableness of data.

- K-
 - 1. Use observation and questioning skills in science inquiry.
 - 2. Ask and answer questions about surroundings and share findings with classmates.
 - 3. Record observations and data with pictures, numbers, and/or symbols.
- 1-
 - 1. Make observations, develop simple questions, and make comparisons of familiar situations.
- 2-
 - 2. Use tools to provide information not directly found through the senses.
 - 3. Make predictions based on observed patterns as opposed to random guessing.
- 3-
 - 1. Make new observations when discrepancies exist between two descriptions of the same object or phenomenon to improve accuracy.
- 4-
 - 1. Use instruments to perform investigations and communicate findings.
 - 2. Differentiate observation from interpretation and understand that a scientific explanation comes in part from what is observed and in part from how the observation is interpreted.

K-4 Benchmark II: Use scientific thinking and knowledge and communicate findings.

5-8 Benchmark I: Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.

- 5- 2. Use appropriate technologies to perform scientific tests and to collect and display data.
- 8- Use a variety of technologies to gather, analyze and interpret scientific data.

5-8 Benchmark II: Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge.

Strand II: Content of Science

Standard II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

5-8 Benchmark III: Understand the structure of organisms and the function of cells in living systems.

- 5- 1. Understand that all living organisms are composed of cells from one to many trillions, and that cells are usually only visible through a microscope.

Vocabulary

micro- (Gr) prefix meaning small

microbe- (bios (Gr) life) a tiny lifeform, especially a disease
causing microorganism

microbiology- study of microorganisms

microchip- small integrated circuit

one micron- micrometer- one millionth of a meter

microphone- makes a small quiet voice louder

microwave- an oven that uses electromagnetic waves (short
wavelengths) to cook food

microscope- an optical instrument that uses a combination of lenses to
produce magnified images of small objects

magnifying glass – a lens that enlarges the image of an object

loupe – a small magnifying glass set in an eyepiece and used chiefly by
jewelers and watchmakers

lens – a piece of transparent material with one or both sides curved.
The curvature of the lens refracts light to form an image that looks
larger than it actually is.

specimen – sample item

flashscope – a handheld magnifying lens with a light

tripod magnifier – a magnifying glass that sits on three legs

slide- small glass plate for mounting specimens to be seen under a
microscope

Extension Activities

Real learning takes place when a student makes connections and **ties** new information to ideas that they have previously learned. These activities provide a few ideas for reviewing and extending the science concepts that we introduce in the “It’s a Small World” Science on Wheels program. We hope that you will find something here that helps **tie** science to other lessons in your classroom!

Create Water Drop Lenses (see worksheets below)

Supplies per student: one microscope slide
 one eyedropper
 a small cup of water
 ruler
 newspaper

Instructions:

1. Place one drop of water in the middle of the microscope slide.
2. Look at the drop from the side and draw it on your record sheet.
3. Choose one word that you plan to view with your slide and circle it.
4. Place your slide on top of your circled word. Move the slide up and down until you get the word in focus. Draw what you see on your record sheet.
5. Measure the distance between the paper and the lens when it is in focus. Record. What do you predict will happen if you use more drops of water?

Repeat this experiment by adding drops to the water on your slide and record what happens each time.

Student Instructions

Water Drop Lenses

Supplies per student: one microscope slide
one eyedropper
a small cup of water
ruler
newspaper

Instructions:


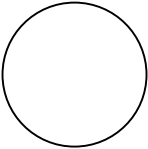

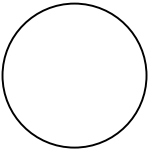

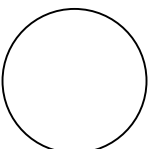

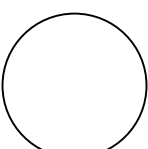

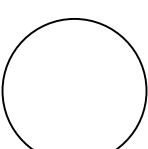
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3. Choose one word that you plan to view with your slide and circle it.
4. Place your slide on top of your circled word. Move the slide up and down until you get the word in focus. Draw what you see on your record sheet.
5. Measure the distance between the paper and the lens when it is in focus. Record. What do you predict will happen if you use more drops of water?

Repeat this experiment by adding drops to the water on your slide and record what happens each time.

Student Worksheet

Water Drop Lenses

Record Sheet:

Number of drops	Draw a side view of your water drop	Draw the view through your lens	Record the distance to focus
			
			
			
			
			

Using the information from your record sheet, draw some conclusions about lenses and magnification.

Magnificent Poetry (see student worksheet below)

The power of observation and the ability to describe what you see is critical to science. When you view objects “up close and personal” it gives you a whole new perspective! This activity forces students to slow down and truly concentrate on the object at hand.

- 1) Students begin by viewing an object through a microscope, magnifying glass, or loupe. (It may be helpful for students to draw what they see before writing what they see.)
- 2) Each student brainstorms lists (see worksheet) of object descriptions, comparisons, and thoughts.

Descriptions should include detailed words or phrases about the color, shape and size (adjectives) of the object’s close-up view.

Comparisons should include analogies, similes, and metaphors—What else does it look like? What else does it remind you of?

Looks like. . . Reminds me of . . .

Thoughts (the final column) should be ideas or questions that they have about what they see. **I wonder. . . Why? What if?**
It may include wishes, hopes, and dreams.

Remind students that it is OK to jump from column to column, because our thoughts often jump from one idea to another.

- 3) Later (maybe days later) students reexamine the object, make additions to their lists, and then choose their most powerful visual images to expand into a poem. It may be a “What am I?” poem, “sandwich” (object, similes, object) poem, or an expanded metaphor (choose one metaphor and expand it, explaining why you chose this metaphor and how the parts are related).

Student Worksheet

Magnificent Poetry

Take some time to look at the world in a whole new way! Use your magnifying tool to view an object closely. Write down any descriptions, comparisons, or thoughts that come to your mind.

descriptions

comparisons

thoughts

Micro World ~ Science on Wheels 2006-2007
Bradbury Science Museum ~ Los Alamos National Laboratory
edu-bsm@lanl.gov

Zoom

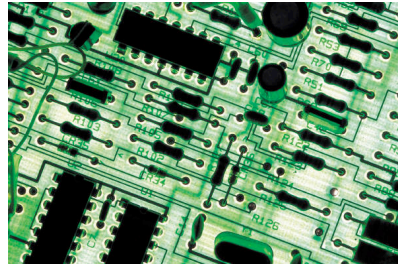
The book Zoom by (for younger students) and the Powers of Ten video by Eames (for older students) both demonstrate the power of scale and magnification. After reading the book or watching the movie discuss that objects appear differently when the magnification changes. Students can create their own Zoom book by taking digital photographs (including the digital microscope if possible) of a specific object from different distances or different magnifications. If this technology isn't possible students could draw the same object from different distances, including the use of a magnifying glass.

Magnification Mysteries

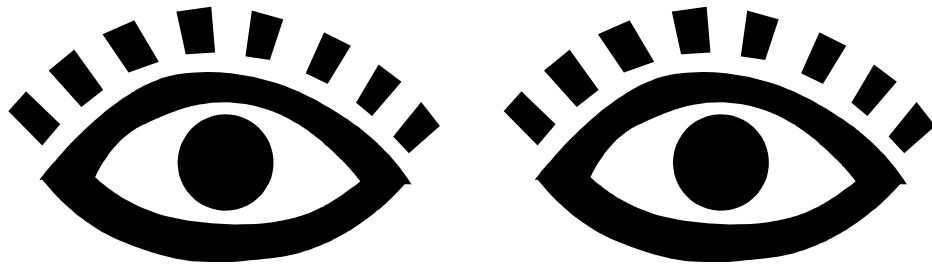
Students take digital microscopic pictures (or sketches) and post them with a riddle about the object's identity. The answer (or identity) of the object could be revealed by tacking it underneath the photo. This could be a "lift the flap" bulletin board.

Los Alamos Science in Action!

It is a
NanoWorld!



Scientists at the Los Alamos National Laboratory are stepping into the “NanoWorld!” A nanometer is one billionth of a meter or a millionth of a millimeter! Scientists are learning to build extremely small things by moving atoms. Nanowires could be one atom thick. Everything is made up of atoms; just imagine the possibilities of being able to move them all around! Circuits, robots, and gears smaller than you could see. Nanorobots that could someday seek out and destroy cancer cells. Would we someday be able to piece together atoms and molecules to make ANYTHING that we wanted?



**The world is full
of magic things
waiting patiently
for our senses
to grow sharper.**

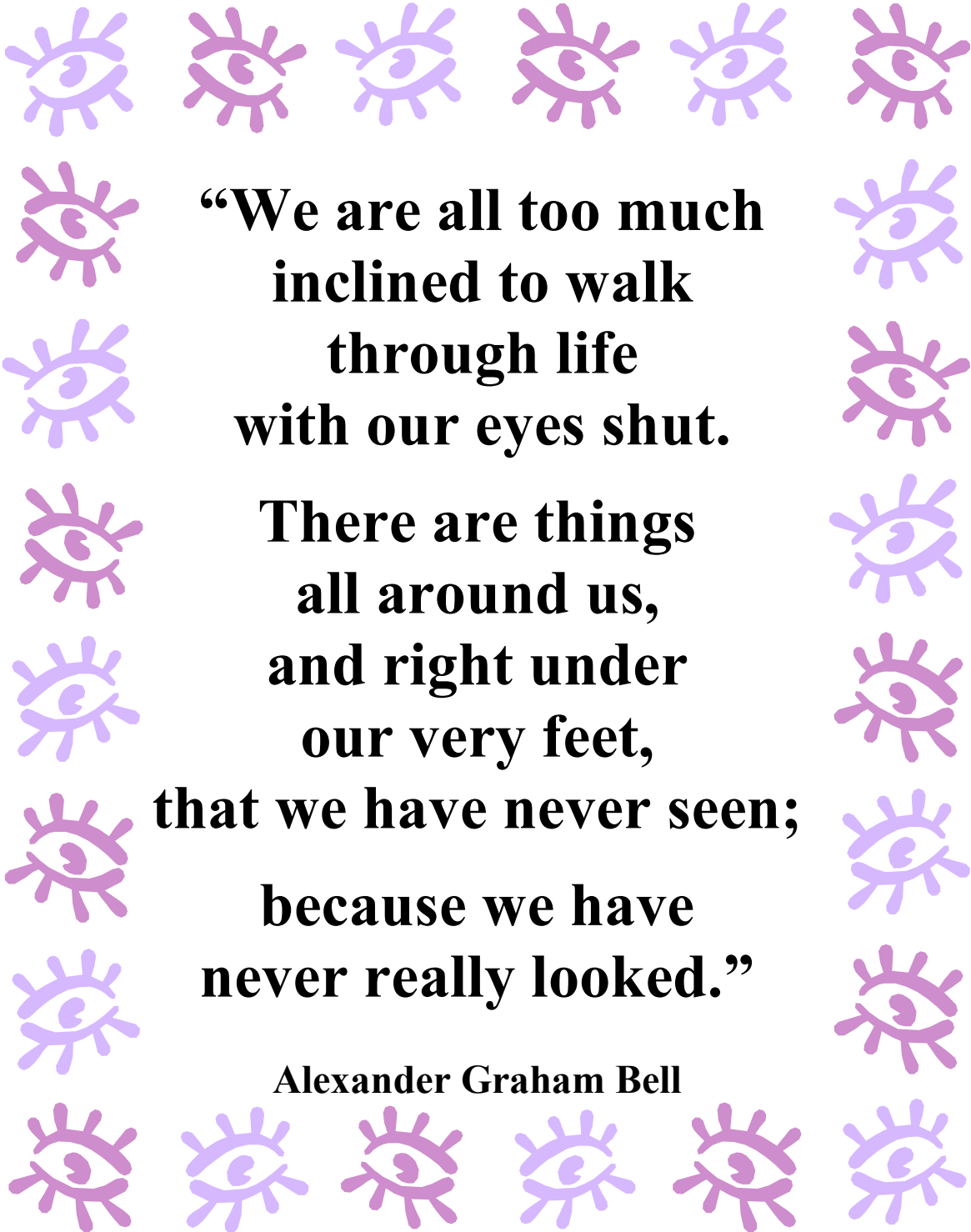
John Keats

**“Nature will bear the
closest inspection.**



**She invites us to lay our
eye level with her
smallest leaf,
and take an insect view
of its plain.”**

Henry David Thoreau



**“We are all too much
inclined to walk
through life
with our eyes shut.**

**There are things
all around us,
and right under
our very feet,
that we have never seen;
because we have
never really looked.”**

Alexander Graham Bell

. The greatest thing by far
is to be a master of metaphor. . .
It is the mark of genius.

Aristotle

“Genius . . .
is the capacity
to see ten things
where the ordinary
man sees one. . .”

Ezra Pound